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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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Group 3700

Application Number: 10/652,677
Filing Date: August 29, 2003
Appellant(s): BOYLE ET AL.

Charles S. Guenzer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed September 16, 2006 appealing from the Office action mailed September 22, 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,056,123	NIEMIROWSKI et al.	5-2000
4,504,224	HEWITT	3-1985

6,361,313	BEYAERT et al.	3-2002
6,033,215	OHSAWA	3-2000
6,395,363	BALLANCE et al.	5-2002
6,171,400	WINGO	1-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 8-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al. in view of Hewitt and Beyaert et al.

With regards to claims 1 and 10, Niemirowski et al. discloses a support tower for supporting wafers in parallel spaced relationship along a vertical axis and a method of fabricating the support tower, wherein a plurality of slots 5 are cut in each of a plurality of silicon legs 1 to form teeth therebetween, the plurality of silicon legs extending along a vertical axis, and opposite ends of the plurality of silicon legs are joined to respective ones of two silicon bases 2, see column 2, lines 19-21, 26-31, 61-67 and column 2, lines 1-20. Niemirowski et al. does not disclose the teeth having both upper and lower surfaces extending outwardly from axially extending portions of the legs at upwardly sloping angle of between 1° and 3° with respect to the vertical axis. However Hewitt

teaches such upwardly slopping teeth for minimizing the area of contact between the supports and the work piece, see column 2, lines 44-56 and figure 1. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al. with teeth having both upper and lower surfaces with an upwardly sloping angle as taught by Hewitt, in order to minimize the area of contact therewith. Although Hewitt does not disclose the sloping angle to be between 1° and 3°, however it is known to provide teeth on support towers with such sloping angle as attested by Beyaert et al., see column 6, lines 31-36, 52-54 and figure 4B. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al./Hewitt with teeth having an upwardly sloping angle between 1° and 3° as taught by Beyaert et al., in order to minimize the contact surface to substantially a segmental or a punctual surface.

For claim 8, Appellant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

For claim 9, see column 3, lines 6-8 of Niemirowski et al.

Claims 4, 7 and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Hewitt/Beyaert et al. as applied to claims 1 and 10 above, and further in view of Ohsawa.

For claims 4 and 13, Niemirowski et al./Hewitt/Beyaert et al. discloses a wafer support tower and a method of fabricating a wafer support tower as shown above except for support surfaces extending perpendicularly to the vertical axis being formed

on the first sides of the teeth at their distal ends. However Ohsawa teaches such support surfaces, see figure 7. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the teeth of the support tower of Niemirowski et al./Hewitt/Beyaert et al. with support surfaces extending perpendicularly to the vertical axis, in light of the teachings of Ohsawa, in order to securely seat the wafers.

For claim 7, Appellant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

Claim 5 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Hewitt/Beyaert et al./Ohsawa as applied to claim 4 above, and further in view of Ballance et al.

Niemirowski et al./Hewitt/Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces being polished. However it is known to polish substrate support surfaces as attested by Ballance et al., see column 2, lines 66-67 and column 3, lines 1-11. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have polished the support surfaces of the support tower of Niemirowski et al./Hewitt/Beyaert et al./Ohsawa, in light of the teachings of Ballance et al., in order to reduce the tendency of the support to scratch the substrate surface.

Claim 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Hewitt/Beyaert et al./Ohsawa as applied to claim 4 above, and further in view of Wingo.

Niemirowski et al./Hewitt/Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces supporting the wafers at places located at between 69% and 72% of a radius of the wafers. However it is known to support wafers at such places as attested by Wingo, see column 4, lines 53-58. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have designed the teeth of the support tower of Niemirowski et al./Hewitt/Beyaert et al./Ohsawa such that the wafers are supported at places located at between 69% and 72% of a radius of the wafers, in light of the teachings of Wingo, in order to provide effective support to the wafers.

Claims 14, 15, 17-20, 22, 24, 25 and 27-29 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al. in view of Hewitt, Beyaert et al. and Ohsawa.

With regards to claims 14, 15, 19, 20, 24, 25 and 29, Niemirowski et al. discloses a support tower for supporting wafers in parallel spaced relationship along a vertical axis and a method of fabricating the support tower, wherein a plurality of slots 5 are cut in each of a plurality of silicon legs 1 to form teeth therebetween, the plurality of silicon legs extending along a vertical axis, and opposite ends of the plurality of silicon legs are joined to respective ones of two silicon bases 2, see column 2, lines 19-21, 26-31, 61-67 and column 2, lines 1-20. Niemirowski et al. does not disclose the teeth having both upper and lower surfaces extending outwardly from axially extending portions of the legs at upwardly sloping angle of between 1° and 3° with respect to the vertical axis. However Hewitt teaches such upwardly slopping teeth, see column 2, lines 44-56 and

figure 1. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al. with teeth having both upper and lower surfaces with an upwardly sloping angle as taught by Hewitt, in order to minimize the area of contact therewith. Although Hewitt does not disclose the sloping angle to be between 1° and 3°, however it is known to provide teeth on support towers with such sloping angle as attested by Beyaert et al., see column 6, lines 31-36, 52-54 and figure 4B. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have provided the support tower of Niemirowski et al./Hewitt with teeth having an upwardly sloping angle between 1° and 3° as taught by Beyaert et al., in order to minimize the contact surface to substantially a segmental or a punctual surface. Niemirowski et al./Hewitt/Beyaert et al. does not disclose support surfaces extending perpendicularly to the vertical axis being formed on the first sides of the teeth at their distal ends, however Ohsawa teaches such support surfaces, see figure 7. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have formed the teeth of the support tower of Niemirowski et al./Hewitt/Beyaert et al. with support surfaces extending perpendicularly to the vertical axis, in light of the teachings of Ohsawa, in order to securely seat the wafers.

For claims 17, 18, 27 and 28, Appellant should note that legs formed of quartz or silicon carbide members are old and well known to those of ordinary skill in the art.

For claim 22, Appellant should note that such wedge-shaped teeth are well known to those of ordinary skill in the art.

Claims 21 and 30 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Hewitt/Beyaert et al./Ohsawa as applied to claims 14 and 24 above, and further in view of Wingo.

Niemirowski et al./Hewitt/Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces supporting the wafers at places located at between 69% and 72% of a radius of the wafers. However it is known to support wafers at such places as attested by Wingo, see column 4, lines 53-58. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have designed the teeth of the support tower of Niemirowski et al./Hewitt/Beyaert et al./Ohsawa such that the wafers are supported at places located at between 69% and 72% of a radius of the wafers, in light of the teachings of Wingo, in order to provide effective support to the wafers.

Claim 23 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Niemirowski et al./Hewitt/Beyaert et al./Ohsawa as applied to claim 13 above, and further in view of Ballance et al.

Niemirowski et al./Hewitt/Beyaert et al./Ohsawa discloses a support tower as shown above except for the support surfaces being polished. However it is known to polish substrate support surfaces as attested by Ballance et al., see column 2, lines 66-67 and column 3, lines 1-11. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have polished the support surfaces of the support tower of Niemirowski et al./Hewitt/Beyaert et al./Ohsawa, in light of the teachings of Ballance et al., in order to reduce the tendency of the support to scratch

the substrate surface. Appellant should note that it is inherent that the portions of the teeth polished in Niemirowski et al./Hewitt/Beyaert et al./Ohsawa/Ballance et al. will be the ones in a plane perpendicular to the first axis since it is that portion that support the wafers.

(10) Response to Argument

In response to Appellant's argument that Hewitt is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the Applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In the instant case, the problem Appellant is trying to solve is how to minimize the area of contact between the supports and the work piece, hence the projecting portions of the legs inclined upwardly as disclosed so as to provide small areas of contact between the legs and the wafers, see page 4, lines 21-23, page 5, lines 16-18 and page 7, lines 12-14, 23 and 24 of the specification for example. The examiner submits that Hewitt is reasonably pertinent to the particular problem with which Appellant was concerned because Hewitt is also concerned with how to minimize the area of contact between the supports and the work piece, hence the upwardly inclined that provide small areas of contact between the supports and the work piece, see column 2, lines 50-56, this arrangement is also taught by Beyaert et al. as outlined in the above rejections.

In response to Appellant's argument that "it is unobvious to substitute the triangular pins of Hewitt for the slots in the rails 5 of Niemirowski or the divider 13' of

Beyaert", Appellant should note that the test for obviousness is not that the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, the examiner is no suggesting to substitute the pins of Hewitt for the slots in the rails 5 of Niemirowski et al., rather the examiner submits that one of ordinary skill in the art would find it obvious to modify the horizontal support teeth of Niemirowski et al. to upwardly inclined support teeth, in view of the teachings of Hewitt in order to provide small areas of contact between the support and the work piece. It should be noted that Hewitt is modifying conventional horizontal supports by providing upwardly inclined ones, which is the same modification Appellant is attempting. The examiner respectfully disagrees with Appellant's statement that the examiner "attempts to show that Hewitt is pertinent to the problem of thermal shadowing addressed by the present invention". As outlined in the above rejections, the examiner's position is that Hewitt is pertinent to the problem of how to minimize the area of contact between the supports and the work piece. Even though Appellant and Hewitt desire small areas of contact for different reasons, however the underlying problem that both Appellant and Hewitt are trying to solve is how to minimize the area of contact between the support and the work piece; thus the fact that Appellant wants a small area of contact so as to avoid thermal shadowing and Hewitt wants a small area of contact in order to minimize the uncoated portion of the work piece that remains visible in the

finished work piece is inconsequential in as much as the problem is how to minimize the area of contact between the support and the work piece; and as shown the above rejections, Hewitt teaches upwardly inclined supports for that purpose, and in both Appellant and Hewitt's state of the art, it had been conventional to have horizontal supports. Therefore the examiner maintains that one of ordinary skill in the art when presented with the teachings of Niemirowski et al., Hewitt and Beyaert et al. would have found it obvious to modify the support teeth of the tower of Niemirowski et al. from horizontal ones to upwardly inclined ones as taught by Hewitt.

In response to Appellant's argument that the "sloping fingers of the claims can be machined in a single setting of a slotter or cutting wheel and the small horizontal support areas can then be machined by a single setting of the polishing wheel or other polishing mechanism", the examiner submits that claims 1, 14 and 24 are product claims and as such determination of patentability is based on the product itself and does not depend on its method of production. As for method claim 10, it is noted that those limitations are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Essama Omgba

Conferees:

David Bryant: SPE 3726

Peter Vo: SPE 3729